COSC 460

Research Project

Department of Computer Science

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MEASURING THE EFFECTIVENESS OF COMPUTING SERVICES

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ACKNOWLEDGEMENTS

I would like to thank my supervisor, Mr J. Good, for his enthusiastic help, advice and encouragement; Mr C. Power who developed the tool and assisted me in its usage; Mr T.G. Price who acted as my liaison at Otago and explained aspects of the Otago systems; and Professor B. Cox who permitted this evaluation to take place at Otago and gave it official support.

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1. INTRODUCTION

This project represents the next stage in an on-going research project into the effectiveness of computing services. Traditionally computer services have been evaluated with regard to machine efficiency: however, no matter how efficient a system's components are, if its services do not meet the needs of its users then that system is a failure. The purpose of this project is to measure the effectiveness from the viewpoint of the user.

The assumption is made that the effectiveness of a service can be measured by assessing the satisfaction or dissatisfaction of its users. For this purpose a tool has been developed at Canterbury. This tool consists of surveying members of the user population by a questionnaire, statistical analysis of the resultant data base and follow-up interviews of selected people.

This project is primarily concerned with testing the portability of the tool by the analysis of a different computer system. As the University of Otago is the only other university with a continuing commitment to Burroughs equipment it was chosen as the testing ground.

2. HISTORICAL BACKGROUND

The idea of measuring the effectiveness of a computing service by asking its users for their opinions is not a new concept. Most computer installations have suggestion books and many hold meetings at which users can air their views. However, major research has been limited in the area of user satisfaction.

One project on this topic was done by McKaskill(1) in 1977. He analysed the effectiveness of commercial data processing installations with respect to the 'user manager' or using Eason's (2) terminology the 'naive user'; this being the term given to a person who interacts with established systems rather than being directly involved with programming.

A university environment has a very different population of users. It is possible to identify these 'naive users', typically secretaries running packages, but there are also two other groups of users. The first of these is the professional programmers, in the case of Otago this constituted Registry employees who are employed to maintain student records and similar applications. Second is the main group of users, the so-called 'amateur users' to whom computing itself is not the main concern but rather a convenient instrument. These users tend to have very different levels of expertise and methods of communication with computer systems, but all invest time

and money to use the computer, and hence must see some value in it.

The first stage of this project was done by M. Chen (3) who developed a survey form for Canterbury and did some data analysis of the results. C. Power (4) refined the questionnaire and did more analysis of the data collected. He also added the concept of follow-up interviews to the tool. These interviews provide an opportunity for feedback on a more personal level and are helpful in explaining results.

The next stage in the process of developing this tool is this project. The tool is being taken to another university with similar equipment but a different organisational structure. Now we must consider the tool and ask:

How portable is it?

Are the results comparable?

3. METHODOLOGY

3.1 The Questionnaire

The first step was to draft a suitable questionnaire with which to survey the Otago users. The original survey was designed to cover the three aspects of a user's interaction with the system.

(1) The nature of the user: his computing experience, current responsibilities, the purpose of his computing, the languages or packages he uses, etc.

(2) His use of the services: his mode and method of communication with the system, the amount spent on computing, etc.

(3) The degree of satisfaction he feels with the different aspects of the service.

In addition to these design criteria the Otago survey was designed with the aims of it:

(1) reflecting the Otago computing services.

(2) being as similar as possible to the Canterbury survey form.

These two aims tended to be conflicting.

It was necessary to spend some time in Dunedin at this stage to gain an understanding of the services provided and the general computing environment of Otago. In order to achieve this several interviews were conducted with

people in different departments who were heavy users of the system. As a result of these interviews and separate observations, a number of differences between the two computing centres became obvious at this stage.

(1) At the time of this report the Computing Centre and Computer Science Department were very closely linked with many people being involved both in teaching and in the service side.

(2) The interactive system used is SCREAM, a locally developed page-oriented system. This was very widely used and is available twenty-four hours a day to those with access to terminals. At Canterbury CANDE is the interactive system used and this is only available during certain times. The majority of users at Canterbury were BATCH users, whereas at Otago they were interactive.

(3) At Otago the computer runs twenty-four hours a day and can be used by anyone with access to it. At Canterbury the hours are restricted with BATCH access only possible from 8.30 am to 7.00 pm, and further reduced hours of CANDE availability.

(4) The charging policy is different, with Otago rates being very much more expensive than those at Canterbury.

(5) No Duty Programmer is officially available at Otago but members of the Computing Centre will give aid when requested.

(6) The Otago Users' Representative Group is made up of selected representatives from the different departments. The Canterbury Users' Group is open to anyone.

(7) During the time of the project Otago was involved in a change-over of equipment and had just purchased a VAX system. It was decided to survey users on their satisfaction with these replacements and the general planning policy in addition to those questions more directly related to the service.

From these results a new questionnaire was drafted. Whenever possible the questions remained the same so as to aid future comparisons. Some of the questions from the Otago survey were discarded as they appeared to be of little significance. Similarly some questions were added, for example to query competition between the Burroughs and other university computing systems.

A pilot questionnaire was now drafted. This was sent to some of the people who were interviewed for comment and correction where it did not truly reflect the Otago set-up or seemed ambiguous. From this feedback the final survey form was drafted (APPENDIX 2). A comparison of the two questionnaires yields the following statistics:

(1) 28 questions are the same.

(2) 16 questions underwent minor changes.

(3) 3 questions were very different.

(4) 7 questions were discarded.

(5) 4 new questions were added.

3.2 Sampling

During the first visit to Otago a list of names and usercodes of users was obtained. From this a list of present users was compiled. One of the difficulties at this stage was that many technicians, computing staff and research students were not surveyed as they use the usercodes of their supervisors. Although the instructions on the questionnaire requested any non-users to pass the form to someone who did use the computer directly, 33 (13%) did not and hence their replies could not be analysed. I would consider this one of the inherent difficulties of analysing results from a distance. At times the analysis would have been made very much simpler if those surveyed were closer.

After deletion of Computer Centre staff and a few other non-current users, a list of 260 people was made. All of these people were sampled as 300 people had been sampled at Canterbury and it was wished to keep the sample size similar.

From these people, 172 (66%) of the questionnaire were returned, but as has been mentioned of these only 139 (53%) were suitable for analysis.

3.3 Analysis of Data

The data from the questionnaires was analysed using SPSS (5). The first step in the analysis was to create a data base. See Appendix 4. As the replies were received

these were checked and coding for open-ended questions was done.

The data base was analysed using various procedures in SPSS. The summary information appearing on the questionnaire was provided by FREQUENCIES. Cross-tabulations were then done to identify relationships between the satisfaction variables and various characteristics of the users.

After this factor analysis (6) was used to see whether there were any underlying patterns in responses to the satisfaction questions. The results from this analysis show which areas tend to most affect individual users' satisfaction with the service. From this analysis each individual was given a score on each relevant factor.

3.4 Interviews

From the score on each of the factors a list of rankings of each individual's response was generated. From this list people were selected in such a way as to ensure that every factor's quartiles were represented. It is important to stress that these people are individuals; what places one person in the bottom quartile on a given factor may have little bearing on another person with a similar score. The purpose of the interviews is to find out why a certain individual scored as he did. However, often the things affecting one person will be areas of concern to others. The interviews give an opportunity for specific details to emerge.

The interviews were made over the span of a week, each taking between half an hour and one and three quarter

hours, with the average being a little over one hour. They were conducted in general by one interviewer, although a member of the Computing Centre sat in on some. It was noted that some people preferred to be interviewed without a member of the Centre present.

3.5 Summary of Process

1) Visit to Otago to become familiar with environment and facilities.

2) Pilot questionnaire drafted.

3) Questionnaire re-drafted and sent out to 260 users.

4) Replies received at Otago and forwarded to Canterbury weekly.

5) Reminder note sent to those who had not replied.

6) Creation and analysis of data base.

7) Interviews.

8) Final collation of information.

4. ANALYSIS

4.1 Initial Frequency Result

The frequencies of answers are summarised on the questionnaire form in APPENDIX 2. From this several points can be made:

1) 57% of those surveyed consider that the computer is necessary for their work, but are not studying the computer itself. These people regard the computer as a tool to be used, but are reliant on it.

2) The alternative computer systems (see APPENDIX 3) are being used by nearly half of those surveyed. At this stage the VAX had just been installed and was being used by many. A large number of people stated that they intended to use the Burroughs system less because of these alternatives.

3) The average monthly expenditure was high. From the answers to the satisfaction questions it would appear that quite a few people were concerned about the charging rates.

4) Many of those surveyed, especially students and post-graduates, had never heard of the Computer Users' Representative Group. Nearly half of the non-members never see their representative. However, the majority of the members attend meetings regularly. There was a tendency among non-members to be indifferent to this group.

5) SCREAM appears to be giving some people problems. Users state that it is difficult to obtain assistance during a session. Only one quarter of the population are confident in its usage, with the majority considering it workable or unfamiliar.

6) Satisfaction with documentation varies among users with the majority being indifferent or unsatisfied.

7) The Computer Centre staff are considered to be competent and readily available by the users. In general, those satisfaction questions relating to the personal aspect of the Centre service have given high results, apart from the question relating to the data preparation service.

8) The replacements, a VAX and a Burroughs 5900, appear to be highly satisfactory to the users.

4.2 Cross Tabulations

Cross tabulations were now carried out in an effort to establish relationships between individual satisfaction variables and the differing characteristics of the user. TABLE 1 shows the results of a cross-tabulation of status and satisfaction with the charging algorithm. From these results it would appear that academic staff were generally less satisfied with the charging, whereas students and Registry employees were indifferent to it. This raises a number of questions, each postulating different explanations.

TABLE 1

KEY

Category	Score
Highly dissatisfied	1
Dissatisfied	2
Indifferent	3
Satisfied	4
Highly satisfied	5

STATUS	Number of Responses of Satisfaction scores					Total	Mean
	1	2	3	4	5		
ACADEMIC	9	15	20	17	1	62	2.77
POSTGRAD	1	6	8	1	2	18	2.83
UNDERGRAD	1	1	23	5	1	31	3.00
REGISTRY	1	0	1	2	0	4	3.00
EXTERNAL	0	1	3	0	0	4	2.75
OTHER	0	5	1	5	0	11	3.00

TABLE 2

KEY

as TABLE 1.

PREPARATION OF INPUT	Number of Responses Scores					Total	Mean
	1	2	3	4	5		
CENTRE DATA PREP.	0	4	2	12	4	22	3.73
OWN DEPT.	1	2	4	3	0	10	2.90
PUNCH OWN CARDS	1	1	16	15	2	35	3.46
VIA TERMINAL	3	7	26	13	1	50	3.04

Are students less sensitive to charging? Are academics more critical?

Similarly TABLE 2 shows the results of a cross-tabulation of preparation method of input with satisfaction with the data preparation service. In general, people who mainly use data preparation facilities seem happier with them than those who use them rarely. Why? The cross-tabulation does not supply the answers to this sort of question. These answers can only be gained by in-depth interviews of the users. As will be later described these questions were answered by the users, pinpointing the reasons for these kinds of attitudes among certain groups.

4.3 Factor Analysis

Having analysed the relationship of certain variables to the satisfaction variables, the next step is to see whether there are any underlying patterns of response among users. Factor analysis was used to achieve this.

This analysis was done in three ways on the basis of questions answered. Factors were evaluated for those people who answered the majority of the SCREAM and general satisfaction questions, for those answering BATCH and general, and on the basis of general satisfaction questions. This was to ascertain if similar factors are affecting the different types of users and to pinpoint those aspects of the service of concern to any user. The results are summarised in TABLES 3, 4 and 5.

The results of factor analysis show that the same things tend to affect all users. These factors have been given the names of PEOPLE, SERVICES, and POLICY OR MONEY, and differ slightly in composition from group to group.

Those people who use SCREAM are more concerned about the help that they can receive, either on a personal basis or via the machine, than they are with the actual speed and facilities of SCREAM. In comparison, the BATCH users are more worried about the nature of the service than they are with the people involved. This is probably due to the natures of interactive and BATCH modes of communication. A person on a terminal tends to need help immediately, whereas a BATCH user is not as time constrained.

The general factors affecting all users show how sensitive people are to the personal aspects of the service: staff competence and availability and the response of the staff to problems, suggestions and unusual requirements.

4.4 Interviews

From the results of the factor analysis scores were generated for each person on each appropriate factor. People were then chosen at random from these lists but an effort was made to interview at least one person from each factor's quartile. In all 13 interviews were done. It would be preferable for more to be done to gain a wider perspective but the sample did include all main user types: academic staff, post-graduates, under-graduates, registry employees and the technicians, and so a wide coverage was gained.

TABLE 3

SCREAM FACTORS

FACTOR (% contribution to variance explained by these factors)	VARIABLE	WEIGHT	QUESTION NUMBER
HELP (37%)	Assistance during session	.74	29.5
	Centre response	.67	31.4
	Staff availability	.75	31.8
	Staff ability	.42	31.9
	Replacements	.47	31.10
	Job diagnostics	.42	31.11
SCREAM (19%)	EDIT time	.70	29.1
	Execution time	.66	29.2
	SCREAM facilities	.52	29.6
POLICY (16%)	Terminal availability	.62	29.3
	Resource limits	.46	29.4
	Replacements	.41	31.10
	Job diagnostics	.36	31.11
	User group	.68	31.12
SERVICES (12%)	Data preparation	.59	31.1
	Unusual requirement	.73	31.6
	Staff availability	.39	31.8

OTHER FACTORS:

Policy 2 (8% of variance) is concerned with planning.

Funds (7% of variance) is concerned with funding.

TABLE 4.

BATCH FACTORS

FACTOR (% of variance)	VARIABLE	WEIGHT	QUESTION NUMBER
BATCH (44%)	Turnaround	.50	28.1
	Hours	.61	28.2
	Submission and collection	.61	28.3
	Queues	.69	28.4
	Location	.34	28.5
PEOPLE (18%)	Centre response	.79	31.4
	Staff availability	.64	31.8
	Staff ability	.66	31.9
SERVICES (13%)	Data preparation	.31	31.1
	Centre response	.31	31.4
	Documentation	.47	31.5
	Unusual requirement	.88	31.6
	Breakdown advice	.49	31.7
MONEY (10%)	Funds	.66	31.2
	Charging fairness	.68	31.3

OTHER FACTORS:

POLICY (8% of variance) is concerned with planning and users group.

BATCH 2 (7% of variance) is concerned with diagnostics and turnaround.

TABLE 5.

GENERAL FACTORS

(% of variance) FACTOR	VARIABLE	WEIGHT	QUESTION NUMBER
PEOPLE (48%)	Centre response	.70	31.4
	Unusual requirement	.38	31.6
	Staff availability	.64	31.8
	Staff ability	.67	31.9
POLICY (19%)	Replacements	.62	31.5
	Diagnostics	.34	31.11
	User group	.59	31.12
	Planning	.39	31.13
MONEY (14%)	Funds	.54	31.2
	Charging fairness	.77	31.3
	Planning	.36	31.13
SERVICES (12%)	Data preparation	.39	31.1
	Centre response	.31	31.4
	Documentation	.58	31.5
	Unusual requirement	.61	31.6
CENTRE HELP (8%)	Unusual requirement	.32	31.6
	Breakdown advice	.73	31.7

As has been mentioned previously, several of those interviewed expressed a desire to be interviewed privately, without a member of the Centre staff present, and it was noted that these people felt happier about explaining their problems to someone not directly involved. The reason for this varied with the person interviewed: some less familiar users did not appear to want to be 'caught out' by people with more computing knowledge, other more knowledgeable users seemed to feel that their relationship with the Centre would suffer. At this stage it became apparent that there was a certain element of distrust in the Centre as an organisation among its users.

Two interviews have been written up as case studies, see APPENDIX 5. All the interviews helped to explain some of the responses to the questionnaires.

There was a wide range of expertise and confidence among those interviewed. Several commented that they would like some kind of beginners course in computing to introduce them to the system, without having to take a full Stage 2 unit.

The interviews were conducted during the trial period of the VAX, hence this service was free. Many people appeared to be making use of this and were impressed with the VAX. When the VAX is fully installed there will be many easily available terminals. The VAX was considered by those interviewed as much more user friendly than the Burroughs; the documentation was good and the HELP facility comprehensive. As a result of this many users intend to switch most of their computing effort to the VAX. Others with heavy commitment

to Burroughs Extended Algol were concerned about problems with using the B5900, the replacement to the B6700. However, in general those interviewed considered the replacements good and were confident that they were chosen with the users' best interests in view.

SCREAM was an area of concern to several of those interviewed. The HELP facility appears to be limited, although this is presently being improved, and the manual seems to be hard to get and even more difficult to understand. One popular comment was that the manual seemed to be written for those people who were totally familiar with the system and nobody else. Students especially seemed to 'fear' SCREAM and lack confidence in their ability to use it. Help while using SCREAM was generally found by asking other users.

Among those interviewed few used the Centre's data preparation service extensively. This was due to very slow turnaround, generally more than a week. Most users felt happier to punch their own cards or enter programmes and data directly. Among those who did use the service a great deal there was the feeling that the service was not as good or as helpful in attitude as it should be.

Charging was one issue that showed a great deal of variance in opinion among those interviewed. Undergraduate students were unconcerned and said that if they ran out of money they just asked for more and received it. Postgraduate and academic staff were more concerned and many felt seriously constrained by the charging. Some considered the charging reasonable, others considered it far too high. At the time of

interviews a great deal of discussion was taking place with regard to this factor.

The Users Representative Group was another area where opinions differed greatly. At the lower levels of the academic structure questions about this group were met with bewilderment as these users had no idea such a group existed. At higher levels there was more confidence in the group with people having faith in their colleagues to represent them. Among the members of the group there appeared to be feelings of dissatisfaction. That the group does not appear to have any impact was a commonly expressed view.

In general those interviewed found the Centre staff approachable and helpful. Some mentioned that they had trouble communicating but that the staff made an effort to understand their problems and give clear answers. Quite a few felt that a duty programmer would make solving problems easier, especially for students and other lower-ranking members of the University environment.

Other comments were:

- card reader not very reliable.
- plot quality poor.
- slave terminals noisy and make other work difficult.
- need for high quality printer.

4.5 Summary

The interviews were most informative and helped explain earlier results. Otago is fortunate to have a staff that considers service an important part of its role. This would

appear to be one of its main strengths. However, there are other aspects that seem to be of concern to users.

The Users Representative Group and the Computing Centre do not appear to have the friendly relationship that would be hoped for and there seem to be elements of distrust on both sides. The charging rate is concerning many users. From the point of view of service there are deficiencies in the SCREAM documentation and in the area of the data preparation service.

Disregarding these aspects, the users appear to feel pleased with the service they are getting and seem confident about the future.

5. COMPARISON OF RESULTS

One of the questions that was asked when this project was begun was whether or not comparisons could be made between the results obtained at different centres. It was concluded that results cannot be compared directly, but that certain points can be inferred from looking at differences in these. The reasons that a direct comparison is not valid are two-fold. Firstly an individual's satisfaction is based on his expectations, which may be affected by many things, for example his experience and his nature. Because of this comparison of the results of two individuals, or two different populations consisting of many individuals, with different expectations will not give a real indication of the effectiveness of those services. The second reason is that even by sampling from very similar environments, two South Island Universities with Burroughs equipment, there were differences in the user populations (see APPENDIX 6). [A direct comparison could be made using a before and after technique to evaluate the impact on one user population of a change in the service. In this case it would be valid as the user population is consistent.]

However, a comparison of differences in the means of the satisfaction variables can be used to point out areas of concern to users, see Table 6. An analysis of this sort adds further weight to previously expressed

TABLE 6

COMPARISON OF SATISFACTION SCORES

(only equivalent questions are considered)

QUESTION		OTAGO mean	CANTERBURY mean	DIFFERENCE (where > .2)
BATCH				
1)	Turnaround	3.5	2.9	0.6
2)	Hours	3.8	3.5	0.3
3)	Submission	3.8	3.4	0.4
4)	Queues	3.7	3.5	0.2
5)	Location	3.7	3.8	
6)	Facilities	3.7	3.6	
INTERACTIVE				
1)	Edit response	3.7	3.2	0.5
2)	Exec response	3.2	3.0	0.2
3)	Hours	3.4	2.7	0.7
4)	Limits	3.5	3.0	0.5
5)	Assistance	3.0	2.7	0.3
6)	Facilities	3.7	3.3	0.4
GENERAL				
1)	Data preparation	3.3	3.9	-0.6
2)	Funds	3.2	3.7	-0.5
3)	Centre response	3.7	3.5	0.2
4)	Documentation	3.0	3.2	-0.2
5)	Unusual requirement	3.7	3.6	
6)	Breakdown advice	3.5	3.3	0.2
7)	Staff availability	3.5	3.6	
8)	Diagnostics	3.4	3.5	
9)	Users Group	3.0	3.0	

results. During the Canterbury survey dissatisfaction was expressed with the hours of the interactive service CANDE. The high loading of the machine was resulting in slow turnaround concerning some users. At the time of the Otago survey users appeared noticably happier with their interactive and BATCH services. Conversely the Otago survey results showed concern by users in their data preparation service and the charging, both of which score lower than the Canterbury average.

It is also interesting to compare the results of the factor analysis. The analysis of Canterbury was done for the BATCH users (see TABLE 7) and can be compared with the Otago analysis of both BATCH and GENERAL factors (TABLES 4 and 5). The results obtained by the analysis were similar in the two studies. Comparing the Otago BATCH factors with those of Canterbury it is noted that there is a difference in the order of importance of that factor relating to the staff, PEOPLE, and those relating to the actual nature of the BATCH mode, BATCH and ACCESS. Comparison with the GENERAL analysis shows similar results with PEOPLE being important to both. From these results it would appear that, as suspected, the personal aspect of the service is very important to users.

The point has been made that a direct comparison of results from different populations is invalid. The examination of these results and the areas of difference can however, highlight those aspects that have already emerged as areas of concern. The results derived from factor analysis also appear to reinforce the view that the same general factors tend to influence different user populations.

TABLE 7.

CANTERBURY UNIVERSITY FACTOR ANALYSIS

(Reproduced with permission of C. Power (4))

FACTOR (% contribution to variance explained by these factors)	VARIABLE	WEIGHT	QUESTION NUMBER (see APPENDIX-1)
PEOPLE (32%)	Staff Availability	.76	35.8
	Duty Programmer	.56	35.7
	Unusual requirement	.55	35.5
	Centre response	.49	35.3
	Data preparation	.45	35.1
ACCESS (26%)	Batch submission	.87	33.3
	Batch turnaround	.47	33.1
	Funds	.44	33.2
	Unusual requirements	.34	35.5
BATCH (22%)	Batch turnaround	.62	33.1
	Batch hours	.52	33.2
	Users Group	.48	35.10
	Batch queues	.30	33.4
HELP (20%)	Documentation	.61	35.4
	Diagnostics	.49	35.9
	Batch Facilities	.36	33.6
	Duty Programmer	.32	35.7

6. PORTABILITY ANALYSIS

The other question that was asked at the beginning of this project concerned the portability of the tool. As the tool consists of three parts the question will be answered for each of these.

Firstly the questionnaire was found to be the least portable part of the tool. The questionnaire needs to reflect the computing environment and hence changes must be made. These changes are often more subtle than they may appear; for this survey it was necessary to change the questionnaire from one mainly dealing with a batch environment to one dealing with an interactive environment. It is important in drafting a questionnaire to talk with both the Computing Centre staff, at all levels, and with members of the user population. In this way it is possible to gain a clearer understanding of the service to be analysed. 'Hands on' experience at this stage is also recommended.

The collection and analysis of the questionnaire data will vary depending where the analysis is being done and how the results are to be analysed. Some difficulties were created by the necessity of analysing Otago data at Canterbury, and it is recommended that this type of analysis be done 'on the spot'. There was a feeling of lack of control caused by the inability to survey all users, problems with ambiguous replies, and the delay in receipt of replies. The analysis of data followed the same procedure as the original survey using SPSS. As SPSS is

widely available this part of the project should not present many difficulties, although other statistical packages could be used where SPSS is not available.

The interview technique used was different in that only one person acted as interviewer and there was usually no Centre representative present. No large areas of difference were noted in these interviews and the Canterbury ones, although it is possible that those interviewed talked more freely to a non-Centre interviewer.

In general the tool appears to be portable, with the main difficulty being in re-drafting the questionnaire form. The results obtained were significant and can be used to point out strengths and weaknesses in those places surveyed. The next step in an analysis of portability would be to evaluate the effectiveness of a computing service with non-Burroughs equipment and ascertain how difficult this was to achieve.

7. SUMMARY

The purpose of this project was two-fold: to analyse the Otago Computing Facility and also to investigate the tool that has been developed for this type of analysis.

The Otago survey has indicated areas of concern to users and also provided interesting statistics about the user population. It has the psychological benefit of having shown that the Computing Centre is interested in providing a good service to its users, and giving these people an opportunity to express their views. It was found that, as at Canterbury, the personal factor was a very important aspect of the computing service.

Use of the tool has shown that the concepts behind it and the methods it uses are sound. It is also relatively easy to implement, the major difficulty being in drafting a suitable questionnaire.

This paper is part of a continuing study into the effectiveness of computing services. It is hoped that this type of evaluation could be undertaken regularly as it provides an important method for feedback from users to occur. A computing centre is a service organisation. As such, it has a responsibility to its users. This type of device provides a method of improving that service.

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APPENDIX 1

CANTERBURY Questionnaire and

Summary of Responses

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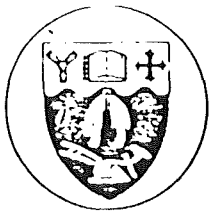

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ASSESSMENT OF THE EFFECTIVENESS OF
UNIVERSITY COMPUTING SERVICES

The attached questionnaire forms part of a survey that is being used in a study of the effectiveness of university computing services. The work is being undertaken by the undersigned as a joint Computer Centre/Computer Science Department project.

You have been chosen at random from the population of users of the Burroughs system, and you are asked to supply certain information concerning the computing that you do. We want to study various characteristics of the computer services and the users and see how these relate to user satisfaction. We hope to test a number of hypotheses that originated in the course of a pilot study which was started by Mary Chen and John Good in 1978.

We wish to obtain a fair picture of the user population, so please respond whether or not you regard your use of the computer as important and whether or not you have strong views about it. Instructions for completion of the questionnaire are given overleaf. All information will be treated as strictly confidential.

If you require further clarification, please do not hesitate to contact either of us: John Good (phone 488-237 (Computer Centre), ext. 85), or Chris Power (phone 482-009 (University), ext. 719). Please return the questionnaire to the above address by 22nd July 1980. Your co-operation will be greatly appreciated.

1 July 1980

John Good
Chris Power

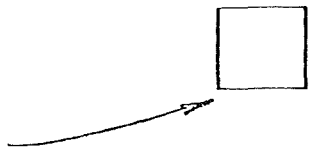
INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

1. Please complete all questions considering your own use of the facilities provided by the Computer Centre at Ilam.

2. Where you are asked to select one of a range of alternative answers, please enter in the box on the right the number which corresponds to your choice.

   Example A:

   1. answer one
   2. answer two
   3. answer three
   4. answer four

   If you select answer three enter a '3' here 

   Example B:

Yes	No
1.	5.

   If your answer is 'No' enter '5' here 

3. Where you are required to supply a numeric value, please enter your value in the spaces provided. For example:

	7	0	%

4. If a question refers to a service that you do not use, or is in some other way irrelevant, please leave the answer space blank.

CONTACT INFORMATION

We intend to follow up this part of the survey by interviewing a selection of users to obtain further information. If you have no objection to being interviewed, please fill in the details below.

NAME: .....

POSITION: .....

DEPARTMENT: .....

ROOM NUMBER (if applicable): .....

TELEPHONE (work/home): .....

STATUS

(1) Which one of the following best describes your status as a user?

1. Academic staff member, teaching or research fellow (31%)
2. Postgraduate student (22%)
3. Undergraduate student (30%)
4. External user (13%)
5. Other (please specify) ..... (4%)

4

APPLICATION AND DEPENDENCY

(2) Which one of the following best describes your major use of the computer?

1. Examination and analysis of research data (37%)
2. Finding solutions to mathematical-type problems (32%)
   (e.g. modelling, simulation, dynamic programming)
3. Information processing (7%)
   (e.g. accounts and records, preparation of texts)
4. Studying computer technology and systems (19%)
   (e.g. Computer Science teaching and research)
5. Using the computer as a teaching tool (6%)
   (e.g. CAL)

5

(3) In the context of your major use, which one of the following best describes the importance of the computer to your work?

1. The work would be impossible to undertake otherwise (28%)
2. The work would be otherwise limited in scope (25%)
3. Use of the computer saves time and effort (19%)
4. The computer itself is an inherent part of the study (29%)

6

(4) Name the field of work for which you use the computer (e.g. Social Science, medicine, agriculture)

.....

(Commerce	8%;	Computing	28%;
Engineering	20%;	Natural Sciences	21%;
Physical Sciences	10%;	Social Sciences	13%)

7

EXPERIENCE

(5) In what year did you first use a computer? 19 [9][10]
(Median: 1975)

(6) Please indicate your age at last birthday. [11][12]
(Mean: 29 years)

(7) How long a total period of instruction in computing have you received?

1. None (5%)
2. Less than one week (11%)
3. One week - one month (19%)
4. One month - six months (23%)
5. Six months - one year (13%)
6. Over one year (29%) [13]

(8) Where did you receive the bulk of your instruction (if any) in computing?

1. Not applicable (4%)
2. Self-taught instruction course (e.g. Programmed instruction courses) (14%)
3. Computer Centre course at Canterbury (6%)
4. University course at Canterbury (43%)
5. Courses at other universities (and academic institutions) (25%)
6. Other (please specify) ..... (9%) [14]

(9) What is the highest level of mathematics that you have studied? Choose the response that matches or is closest to that level.

1. School Certificate (5%)
2. University Entrance (14%)
3. Undergraduate level (69%)
4. Postgraduate level (13%) [15]

(10) How adequate do you feel your mathematical knowledge is for the computing that you do?

Inadequate	Poor	Workable	Good	More than sufficient
1 (2%)	2 (5%)	3 (30%)	4 (29%)	5 (34%)

[16]

CONTACT

(11) Do you instruct student classes in the use of computers, or act as a supervisor or consultant for classes?

YES 1 (28%) NO 5 (72%) [ ] 17

(12) Do you supervise individual research students or workers who use the computer?

1 (29%) 5 (71%) [ ] 18

(13) Do you have a departmental computer-related position, either official (e.g. consultant, liaison officer) or unofficial (e.g. local expert, charge of dept. software)?

1 (27%) 5 (73%) [ ] 19

(14) If you have ever used computing facilities other than those provided by the Computer Centre, please specify these, otherwise write 'Nil'.

.....

(Department 22%; Other 37%; Nil 41%)

[ ] 20

(15) What is your average gross expenditure on computing per month (in dollars)? (Mean: $31)

[ ] 21

(16) On average how often do you use the computer?

Never	1 (2%)	Monthly	4 (17%)
Yearly	2 (8%)	Weekly	5 (37%)
Quarterly	3 (14%)	Daily	6 (22%)

[ ] 24

(17) How would you summarise the distribution of your computing activity over a year?

Very Irregular	Irregular	Sporadic	Regular	Continual
1 (13%)	2 (16%)	3 (36%)	4 (23%)	5 (11%)

[ ] 25

(18) At most, how long is it between the occasions on which you use the computer?

1 day	1 week	1 month	Several months	A year or more
1 (6%)	2 (21%)	3 (30%)	4 (34%)	5 (9%)

[ ] 26

MODE AND LANGUAGE SKILLS

(19.1) Name the language or package that you work with most: .....

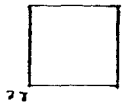
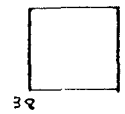
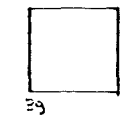
(19.2) Indicate the percentage of your work done with this language.

If you use other languages or packages, answer question (20). Otherwise leave blank.

(20.1) Name the other language or package that you work with most: .....

(20.2) Indicate the percentage of your work done with this language.

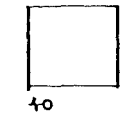
(21) How do you rate your knowledge of:

	Nil	Poor	Workable	Good	Fluent	
(21.1) - the language or package that you work with most	1 (2%)	2 (6%)	3 (45%)	4 (31%)	5 (16%)	
(21.2) - Burroughs Work Flow Language (job control language)	1 (18%)	2 (32%)	3 (37%)	4 (8%)	5 (5%)	
(21.3) - Burroughs CANDE (interactive system)	1 (39%)	2 (27%)	3 (19%)	4 (8%)	5 (7%)	

If your use of the computer involves developing programs (as opposed to providing data for packages), answer questions (22) and (23). Otherwise, please leave blank.

(22) How do you write your programs?

1.	In collaboration with others	(14%)
2.	By yourself	(62%)
(	Don't write programs)	(24%)



(23) Once your typical program is developed, will it:

1. Be used repeatedly with different parameters and/or data? (29%)
2. Be run again after modification or incorporation with other programs? (10%)
3. Have provided the end solution to the problem and will not be run again? (35%)

(Don't write programs) (26%)

41

MEDIUM

(24) There is a choice between use of the batch and CANDE services. Indicate the percentage of your computing effort spent on batch work. (If you use neither batch nor CANDE please leave the answer space blank). (Batch only 45%; both media 43%; CANDE only 4%; blank 8%)

42 %

(25) Through which medium do you usually submit batch jobs?

1. Local batch at the Computer Centre (50%)
2. Remote batch at the Engineering School (21%)
3. Remote batch at Lincoln College (11%)
4. Department courier (12%)
5. Not a batch user (7%)

45

(26) How do you usually prepare your programs and data for input to the computer?

1. Use the professional data preparation service at the Computer Centre (51%)
2. Use professional data preparation service at Lincoln College (8%)
3. Do your own key punching (35%)
4. Explain your needs to someone else. (6%)

46

SUPPORT

(27) Roughly speaking, how often do you consult a Duty Programmer or programmer/analyst staff?

Never	Yearly	Quarterly	Monthly	Weekly or more often
1 (26%)	2 (22%)	3 (25%)	4 (20%)	5 (8%)

47

(28) Do you have a copy of the Users' Guide? Yes No

1 (54%) 5 (46%)

48

(29) Do you receive copies of the User Notes? Yes No

1 (40%) 5 (60%)

49

(30) Do you receive regular copies of the Newsletter? Yes No

1 (44%) 5 (56%)

50

(31) How often do you consult documentation?

Never	Infrequently	Occasionally	Often	All the time
1 (12%)	2 (25%)	3 (33%)	4 (28%)	5 (3%)

51

(32) How many Users' Group meetings do you attend per year? (None 83%; One 6%; Two 4%; Three 7%)

52

SATISFACTION

Please rate your satisfaction with topics considered in the next section according to the scale:

1. Highly dissatisfied
2. Dissatisfied
3. Indifferent - neither satisfied nor dissatisfied
4. Satisfied
5. Highly satisfied

If you have particular comments about any of the questions in this section, please write them on the last page of the questionnaire.

	Highly dissatisfied	Dissatisfied	Indifferent	Satisfied	Highly satisfied	
BATCH						
(33) If you use the batch service, please indicate how satisfied you are with:						
33.1 Turnaround time	1 (10%)	2 (33%)	3 (20%)	4 (33%)	5 (4%)	53
33.2 Hours of availability of batch facilities	1 (6%)	2 (14%)	3 (17%)	4 (53%)	5 (10%)	54
33.3 Job submission and collection procedures	1 (8%)	2 (10%)	3 (25%)	4 (48%)	5 (9%)	55
33.4 Present queue and priority structure	1 (2%)	2 (9%)	3 (31%)	4 (51%)	5 (8%)	56
33.5 Location of batch facilities	1 (1%)	2 (8%)	3 (24%)	4 (50%)	5 (18%)	57
33.6 Range of facilities available	1 (3%)	2 (9%)	3 (32%)	4 (47%)	5 (10%)	58
CANDE						
(34) If you use the CANDE service, please indicate how satisfied you are with:						
34.1 Response time for editing	1 (4%)	2 (28%)	3 (20%)	4 (42%)	5 (6%)	59
34.2 Response time for execution of tasks	1 (5%)	2 (31%)	3 (25%)	4 (33%)	5 (6%)	60
34.3 Access available to CANDE services	1 (13%)	2 (36%)	3 (28%)	4 (18%)	5 (6%)	61
34.4 CANDE task resource limits (e.g. processtime 30 secs)	1 (8%)	2 (25%)	3 (33%)	4 (28%)	5 (6%)	62
34.5 Ease of obtaining assistance during a session	1 (8%)	2 (29%)	3 (48%)	4 (14%)	5 (1%)	63
34.6 Range of facilities available	1 (4%)	2 (14%)	3 (37%)	4 (39%)	5 (5%)	64

GENERAL

35) How satisfied are you with:

		Highly dissatisfied	Dissatisfied	Indifferent	Satisfied	Highly satisfied	
35.1	Quality of data preparation service	1 (1%)	2 (3%)	3 (21%)	4 (50%)	5 (25%)	65
35.2	Adequacy of computing funds to support your projects	1 (5%)	2 (12%)	3 (12%)	4 (47%)	5 (24%)	66
35.3	Response of Computer Centre to problems or suggestions that you have	1 (1%)	2 (5%)	3 (44%)	4 (37%)	5 (12%)	67
35.4	Quality of available documentation	1 (7%)	2 (17%)	3 (31%)	4 (40%)	5 (5%)	68
35.5	Willingness of Computer Centre to make provision for an unusual requirement	1 (1%)	2 (6%)	3 (44%)	4 (34%)	5 (16%)	69
35.6	Advice on system availability, breakdowns and delays	1 (4%)	2 (18%)	3 (32%)	4 (38%)	5 (8%)	70
35.7	Adequacy of Duty Programmer service	1 (1%)	2 (5%)	3 (40%)	4 (41%)	5 (12%)	71
35.8	Availability of Computer Centre staff	1 (2%)	2 (8%)	3 (36%)	4 (39%)	5 (14%)	72
35.9	Job/session diagnostics and error messages	1 (2%)	2 (12%)	3 (28%)	4 (51%)	5 (8%)	73
35.10	The Users Group as a medium of communication your needs	1 (1%)	2 (11%)	3 (71%)	4 (17%)	5 (0%)	74

75 80

GENERAL ASSESSMENT

(36) If you wish to clarify or expand upon any of your answers, please do so here.

Comments regarding the services provided are summarised below:

Batch service

- the inadequacy of the batch service received by undergraduate students required to use departmental courier services
- poor turnaround
- operator delays in handling input and output

CANDE service

- restricted hours and availability of terminals
- poor response

General services

- poor documentation; in particular concerning Work Flow Language and file handling
- lack of Centre expertise in statistical packages

(37) We will be pleased to receive below any comments you may wish to make about aspects of the service not covered by the questionnaire (graphics facilities, software packages, etc.).

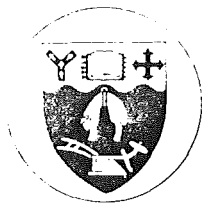
The main points are listed below:

- inadequacy of Calcomp plotter and other graphics facilities
- the lack of card punch machines in the Engineering terminal room
- the general availability and reliable of the system
- file backup facilities and magnetic tape safeguards
- sharing the resource between undergraduate students and other users; between batch and interactive services.

APPENDIX 2

OTAGO Questionnaire and

Summary of Responses



Department of Computer Science
University of Canterbury Christchurch 1 New Zealand

ASSESSMENT OF THE EFFECTIVENESS OF THE
OTAGO UNIVERSITY COMPUTING SERVICES

The attached questionnaire forms part of a survey that is being used to study the effectiveness of the Otago University computing services. This work is being undertaken independently by the undersigned from the University of Canterbury and forms the next step in a research project.

You have been chosen at random from the population of users of the Burroughs system, and you are asked to supply certain information concerning the computing you do. We want to study various characteristics of the computer services and the users and see how they relate to user satisfaction. We hope to test a number of hypotheses that originated from similar surveys undertaken at the University of Canterbury from 1978 to 1980. We will also be interested in seeing how the different computing services affect the user populations.

We wish to obtain a fair picture of the user population, so please respond whether or not you regard your use of the computer as important and whether or not you have strong views about it. Conversely if you have never done any computing on the Burroughs system could you please forward the questionnaire to another member of your department as the survey is aimed at those users who are or have been in direct contact with the Burroughs system. Instructions for completion of the questionnaire are given overleaf. All information will be treated as strictly confidential.

Please return your questionnaire by 22 July 1981 in a sealed envelope to Graham Price at the Computer Centre who will then forward it to us. If you require further clarification, please do not hesitate to contact Mr Price who will be acting as our liaison. Your co-operation will be greatly appreciated.

John Good
Christine Burnside

1 July 1981

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

1. Please complete all questions considering your own use of the Burroughs computer and related facilities provided by the Computer Centre at Otago.

2. Where you are asked to select one of a range of alternative answers, please enter in the box on the right the number which corresponds to your choice.

   Example A:

   1. answer one
   2. answer two
   3. answer three
   4. answer four

   If you select answer three enter a '3' here 

   Example B:

Yes	No
1.	5.

   If your answer is 'No' enter '5' here 

3. Where you are required to supply a numeric value, please enter your value in the spaces provided. For example:

   7 0 %

4. If a question refers to a service that you do not use, or is in some other way irrelevant, please leave the answer space blank.

CONTACT INFORMATION

We intend to follow up this part of the survey by interviewing a selection of users to obtain further information. If you have no objection to being interviewed, please fill in the details below.

NAME: .....

POSITION: .....

DEPARTMENT: .....

ROOM NUMBER (if applicable): .....

TELEPHONE (work/home): .....

STATUS

(1) Which one of the following best describes your status as a user?

1. Academic staff member, teaching or research fellow (47%)
2. Postgraduate student (13%)
3. Undergraduate student (26%)
4. Registry employee (3 %)
5. External user (4 %)
6. Other (please specify) ...e.g. technician..... (8 %)

4

APPLICATION AND DEPENDENCY

(2) Which one of the following best describes your major use of the Burroughs computer?

1. Studying computer technology and systems (17%)
   (e.g. Computing courses and Computer Science research)
2. Examination and analysis of research data (56%)
3. Finding solutions to mathematical-type problems (14%)
   (e.g. modelling, simulation, dynamic programming)
4. Information processing (12%)
   (e.g. accounts and records, preparation of texts)
5. Using the computer as a teaching tool (1 %)
   (e.g. Computer Assisted Learning)

5

(3) In the context of your major use, which one of the following best describes the importance of the computer to your work?

1. The work would be impossible to undertake otherwise (31%)
2. The work would be otherwise limited in scope (27%)
3. Use of the computer saves time and effort (22%)
4. The computer itself is an inherent part of the study (20%)

6

EXPERIENCE

(4) In what year did you first use a computer? 19 [ ][ ] 7

(5) How long a total period of instruction in computing have you received?

1. None (9%)
2. Less than one week (19%)
3. One week - one month (22%)
4. One month - six months (14%)
5. Six months - one year (9%)
6. Over one year (28%)

[ ] 9

(6) Where did you receive the bulk of your instruction (if any) in computing?

1. Not applicable (5%)
2. Self-taught instruction (28%)
3. Computer Centre instruction course at Otago (11%)
4. University unit at Otago (30%)
5. Courses at other academic institutions (19%)
   (e.g. other universities, schools, technical institutes)
6. Courses at a non-academic institution (1%)
7. Other (please specify) personal tuition...(5.%)..

[ ] 10

CONTACT

(7) Do you instruct student classes on the use of computers, or act as a supervisor or consultant for classes? YES 1 (25%) NO 5 (75%) [ ] 11

(8) Do you supervise individual research students or workers who use the computer? 1 (36%) 5 (64%) [ ] 12

(9) Do you act as a departmental computing consultant, either officially or unofficially? 1 (38%) 5 (62%) [ ] 13

(10) If you have ever used computing facilities other than those provided by the Computer Centre, please specify these, otherwise write 'Nil'.


14

.(see.next.page.for.table).....

(11) Do you currently use computing facilities other than the Burroughs computer and the related equipment? If so, please specify, otherwise write 'Nil'.


15

.(see.next.page.for.table).....

(12) What is your average gross expenditure on computing per month (in dollars)?

$
16

(see next page)

(13) On average how often do you use the computer?

Never	1	(1%)	Monthly	4	(16%)
Yearly	2	(4%)	Weekly	5	(42%)
Quarterly	3	(18%)	Daily	6	(19%)


20

(14) How would you summarise the distribution of your computing activity over a year?

Very Irregular	Irregular	Sporadic	Regular	Continual
1 (7%)	2 (20%)	3 (29%)	4 (31%)	5 (13%)


21

(15) How often do you intend to use a Burroughs system in the future?

1.	Not at all	(9%)
2.	Less than at present	(36%)
3.	The same	(33%)
4.	More than at present	(19%)
5.	A great deal more	(1%)

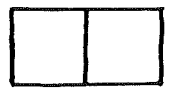

22

Please indicate the reason for a change (if applicable)

.(see next page for table).....


23

(16) Name the language or package that you work with most: ..... Indicate the percentage of your work done with this language.


25

(see next page for table)


27 %

10) Previously used computing facilities.

1)	None	(53%)
2)	Academic	(34%)
3)	Commercial	(13%)

11) Currently used computing facilities

1)	None	(49%)
2)	Academic	(48%)
3)	Commercial	(1%)
4)	Other, e.g. own micro	(1%)

12) Average expenditure per month

The range of spending was very wide and hence has been sub-grouped to give a better indication.

	Number	Average
Spend less than $300	106	$ 80
Spend more than $300 (excluding Registry)	9	$560

The Registry has a much higher spending rate.

15) Reasons for change

1)	Too dear	(3%)
2)	Less computing being done	(14%)
3)	Use of alternatives	(27%)
4)	Unhappy with service	(2%)
5)	Increased use	(19%)

16) 17) Languages or Packages used mainly

	Main Language %	Second Language %
ALGOL	17	11
BASIC	2	7
COBOL	3	3
FORTRAN	22	7
PASCAL	18	3
PL/1	4	1
VARIOUS LANGUAGES	1	2
BMDP	2	9
FREQUENCY	1	Ø
SPSS	12	4
TEDDYBEAR	9	3
LERTAP	1	Ø
GOLLIWOG	Ø	1
ECTA	Ø	1
VARIOUS PACKAGES	4	2
FILE MANIPULATION	2	1

If you use other languages or packages, answer question (17).
Otherwise leave blank.

(17) Name the other language or package that you work most with: ..... Indicate the percentage of your work done with this language. (see previous page for table)

30 32 %

(18) How do you rate your knowledge of:

	Nil	Poor	Workable	Good	Fluent	
⌐=3.4 ⌙=1.13 - the language or package that you work with most	1 (5%)	2 (15%)	3 (33%)	4 (25%)	5 (20%)	35
⌐=2.5 ⌙=1.04 - Burroughs Work Flow Language (job control language)	1 (19%)	2 (26%)	3 (37%)	4 (12%)	5 (3%)	36
⌐=2.6 ⌙=1.29 - SCREAM (the interactive system)	1 (28%)	2 (14%)	3 (30%)	4 (17%)	5 (8%)	37

(19) Which best describes your use of programs or packages:

1. Use packages for statistical analysis, simulation or numerical analysis. (50%)
2. Write programs that will be used repeatedly with different parameters and/or data? (23%)
3. Write programs that will be run again after modification or incorporation into other programs? (4%)
4. Write programs that will provide an end solution to a problem. (18%)
5. Other. Please specify ..... (2%)
   .....

38

39

MEDIUM

(20) Through which medium do you usually submit your jobs to the Burroughs?

1. Cards at the Computer Centre (39%)
2. Cards at the Preventive Medicine batch terminal (10%)
3. By placing jobs in the queues via a SCREAM terminal (25%)
4. Interactively via a SCREAM terminal (26%)

40 ☐

(21) How do you usually input your programs and data?

1. Use the Computer Centre professional data preparation facilities (16%)
2. Use your own department's professional data preparation service (8%)
3. Punch your own cards (31%)
4. Type in your program or data through a terminal (44%)

41 ☐

(22) How do you normally receive output for your problems?

1. Pick it up from the Computer Centre pigeon holes yourself (52%)
2. Direct the output to a printer to which you have immediate access (32%)
3. Have it brought to the department by courier (7%)
4. Read results from a SCREAM terminal (9%)

42 ☐

SUPPORT

(23) Roughly speaking, how often do you see a Computer Centre staff member about a programming problem?

Never	Yearly	Quarterly	Monthly	Weekly or more often
1 (20%)	2 (23%)	3 (19%)	4 (27%)	5 (10%)

43 ☐

(24) How many Computer Centre User's Guide do you have?

1	2	3	4	5 or more
1 (25%)	2 (12%)	3 (10%)	4 (7%)	5 (36%)

44 ☐

(25) Do you receive copies of the Newsletter?

Yes	No
1	5
(43%)	(52%)

45

(26) How often do you consult documentation?

Never	Infrequently	Occasionally	Often	All the time
1	2	3	4	5
(9%)	(17%)	(31%)	(31%)	(8%)

46

FEEDBACK

(27) Are you a Member of the Computer User Representatives Group?

Yes	No
1	5
(20%)	(80%)

47

If you are a member, how often do you attend meetings per year?

ver	Once	Twice	Three or more times
0	1	3	5
%)	(8%)	(8%)	(77%)

48

If you are not a member, how often do you see your Representative?

Never		From time to time		Frequently
1	2	3	4	5
(45%)	(2%)	(14%)	(6%)	(11%)

49

SATISFACTION	Highly dissatisfied	Dissatisfied	Indifferent	Satisfied	Highly satisfied	
If you						
(a) enter your programs in the form of cards						
or (b) pick up your print-out from the Computer Centre pigeon holes						
or (c) place your jobs in the queues via SCREAM						
then you are a BATCH user						
(28) If you are a BATCH user please indicate how satisfied you are with:						
1. Turnaround time	1 (2%)	2 (20%)	3 (13%)	4 (57%)	5 (8%)	50
2. Hours of availability of BATCH facilities	1 (2%)	2 (11%)	3 (14%)	4 (57%)	5 (16%)	51
3. Job submission and collection procedures	1 (0%)	2 (7%)	3 (20%)	4 (61%)	5 (12%)	52
4. Present queue and priority structure	1 (0%)	2 (8%)	3 (23%)	4 (61%)	5 (8%)	53
5. Location of BATCH facilities	1 (2%)	2 (7%)	3 (26%)	4 (59%)	5 (8%)	54
6. Range of facilities available	1 (1%)	2 (7%)	3 (26%)	4 (59%)	5 (8%)	55
(29) If you use SCREAM interactively please indicate how satisfied you are with:						
1. Response time for editing	1 (1%)	2 (13%)	3 (9%)	4 (71%)	5 (6%)	56
2. Response time for execution of tasks	1 (6%)	2 (22%)	3 (25%)	4 (44%)	5 (3%)	57
3. Availability of SCREAM terminals to you, e.g. hours, access to terminals	1 (5%)	2 (27%)	3 (9%)	4 (43%)	5 (17%)	58
4. SCREAM task resource limits (e.g. processtime)	1 (1%)	2 (11%)	3 (29%)	4 (52%)	5 (6%)	59
5. Ease of obtaining assistance during a session	1 (4%)	2 (31%)	3 (35%)	4 (23%)	5 (8%)	60
6. Range of facilities available	1 (1%)	2 (8%)	3 (30%)	4 (49%)	5 (13%)	61

(30) There is a choice between BATCH and SCREAM services. Indicate the percentage of your computing effort spent on SCREAM interactive and BATCH work.

SCREAM:..... BATCH:.....

62

(31) How satisfied are you with:

	Highly dissatisfied	Dissatisfied	Indifferent	Satisfied	Highly Satisfied	
1. Quality of data preparation service	1 (4%)	2 (12%)	3 (41%)	4 (37%)	5 (6%)	65
2. Adequacy of computing funds to support your projects	1 (12%)	2 (17%)	3 (24%)	4 (39%)	5 (9%)	66
3. Fairness of the charging algorithm	1 (9%)	2 (22%)	3 (43%)	4 (23%)	5 (3%)	67
4. Response of Computer Centre to problems or suggestions that you have	1 (2%)	2 (4%)	3 (29%)	4 (50%)	5 (16%)	68
5. Quality of available documentation	1 (7%)	2 (28%)	3 (26%)	4 (39%)	5 (1%)	69
6. Willingness of Computer Centre to make provision for an unusual requirement	1 (0%)	2 (4%)	3 (38%)	4 (45%)	5 (13%)	70
7. Advice on system availability, breakdowns and delays	1 (0%)	2 (19%)	3 (26%)	4 (45%)	5 (10%)	71
8. Availability of Computer Centre staff	1 (3%)	2 (9%)	3 (29%)	4 (50%)	5 (10%)	72
9. Ability of Computer Centre staff to help with programming problems	1 (2%)	2 (8%)	3 (29%)	4 (42%)	5 (19%)	73

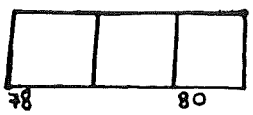
	Highly dissatisfied	Dissatisfied	Indifferent	Satisfied	Highly Satisfied	
10. That the proposed replacements for the B6700 will meet your needs	1 (2%)	2 (5%)	3 (30%)	4 (52%)	5 (11%)	74
11. Job/session diagnostics and error messages	1 (2%)	2 (21%)	3 (21%)	4 (51%)	5 (5%)	75
12. The User's Representative Group as a medium for communicating your needs	1 (5%)	2 (7%)	3 (50%)	4 (36%)	5 (2%)	76
13. The ways in which planning for the university computing services are carried out	1 (9%)	2 (16%)	3 (40%)	4 (34%)	5 (2%)	77

MEAN AND STD DEVIATION OF SATISFACTION VARIABLES

BATCH		mean	std
1)	Turnaround	3.5	0.96
2)	Hours	3.8	0.91
3)	Submission	3.8	0.74
4)	Queues	3.7	0.73
5)	Location	3.7	0.83
6)	Facilities	3.7	0.76
SCREAM			
1)	Edit response	3.7	0.82
2)	Exec response	3.2	1.00
3)	Hours	3.4	1.19
4)	Limits	3.5	0.83
5)	Assistance	3.0	1.01
6)	Facilities	3.7	0.85
GENERAL			
1)	Data preparation	3.3	0.90
2)	Funds	3.2	1.17
3)	Charging	2.9	0.97
4)	Centre response	3.7	0.83
5)	Documentation	3.0	0.99
6)	Unusual requirement	3.7	0.75
7)	Breakdown advice	3.5	0.91
8)	Staff availability	3.5	0.90
9)	Staff ability	3.7	0.95
10)	Replacements	3.6	0.83
11)	Diagnostics	3.4	0.94
12)	Users group	3.2	0.81
13)	Planning	3.0	0.96

(32) If you wish to clarify or expand upon any of your answers please do so here.

(33) We will be pleased to receive below any comments you may wish to make about aspects of the service not covered by the questionnaire (graphics facilities, software packages, etc.).



Department of Computer Science
University of Canterbury Christchurch 1 New Zealand

ASSESSMENT OF THE EFFECTIVENESS OF THE

OTAGO UNIVERSITY COMPUTING SERVICES

We would like to remind you of the questionnaire that was sent to you earlier this month. If you have not already done so, please complete it and return it as soon as you can.

Questionnaire returns may be posted to the above address, or handed to office staff in the Computing Centre, to be forwarded to us. University users can make use of the internal mail service and send their questionnaire to Mr T.G. Price at the Computing Centre.

If you have any queries, do not hesitate to contact Graham Price at the Computing Centre. Your co-operation is greatly appreciated.

23 July 1981

John Good
Christine Burnside

APPENDIX 3

Otago University Computing Equipment

OTAGO COMPUTING EQUIPMENT

1. MICROS

Anatomy	1
Commerce	1
Computing Centre	4
Mineral Technology	1
Psychology	1
Wellcome Institute	2

2. MINIS

Biochemistry	1
Commerce	1
Computing Centre	1
Geology	1
Physics	6
Physiology	1
Preventative Medicine	1
Registry	1
Wellcome Institute	1

3. MAXIS

Computer Centre	1

This list is dated 26/2/81 before the arrival of the VAX.

APPENDIX 4

CREATION OF DATA BASE

SPSS LISTING

SPSS FOR BURROUGHS LARGE SYSTEMS, VERSION H, RELEASE 8.1, AUGUST 15, 1980

CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM

ORDER FROM MCGRAW-HILL: SPSS, 2ND ED. (PRINCIPAL TEXT)
SPSS PRIMER (BRIEF INTRO TO SPSS)
SPSS UPDATE (USE W/SPSS,2ND FOR REL. 7 & 8)

ORDER FROM SPSS INC.: SPSS STATISTICAL ALGORITHMS
SPSS POCKET GUIDE, RELEASE 8
KEYWORDS: THE SPSS INC. NEWSLETTER

DEFAULT SPACE ALLOCATION.. ALLOWS FOR..
WORKSPACE 17500 WORDS 50 TRANSFORMATIONS
TRANSPACE 2500 WORDS 400 RECODE VALUES + LAG VARIABLES
600 IF/COMPUTE OPERATIONS

```
  1 RUN NAME        DATA DESCRIPTION
  2 FILE NAME       OTAGO
  3 VARIABLE LIST   ID,ST1 TO ST3,E1 TO E3,R1 TO R3,E4,E5,
  4                 C1 TO C13,M1 TO M3,SU1 TO SU4,F1 TO F3,
  5                 B1 TO B6,SC1 TO SC6,SB,$1 TO S13,I,COM
  6 INPUT MEDIUM    CARD
  7 N OF CASES      139
  8 INPUT FORMAT    FIXED
  9                 (F3.0,3F1.0,F2.0,7F1.0,F4.0,3F1.0,2F2.0,F3.0,F2.0,F3.0,
 10                 4F1.0,1X,22F1.0,F3.0,15F1.0)
```

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
ID	F 3. 0	1	1- 3
ST1	F 1. 0	1	4- 4
ST2	F 1. 0	1	5- 5
ST3	F 1. 0	1	6- 6
E1	F 2. 0	1	7- 8
E2	F 1. 0	1	9- 9
E3	F 1. 0	1	10- 10
R1	F 1. 0	1	11- 11
R2	F 1. 0	1	12- 12
R3	F 1. 0	1	13- 13
E4	F 1. 0	1	14- 14
E5	F 1. 0	1	15- 15
C1	F 4. 0	1	16- 19
C2	F 1. 0	1	20- 20
C3	F 1. 0	1	21- 21
C4	F 1. 0	1	22- 22
C5	F 2. 0	1	23- 24
C6	F 2. 0	1	25- 26
C7	F 3. 0	1	27- 29
C8	F 2. 0	1	30- 31
C9	F 3. 0	1	32- 34
C10	F 1. 0	1	35- 35
C11	F 1. 0	1	36- 36
C12	F 1. 0	1	37- 37
C13	F 1. 0	1	38- 38
M1	F 1. 0	1	40- 40
M2	F 1. 0	1	41- 41
M3	F 1. 0	1	42- 42
SU1	F 1. 0	1	43- 43
SU2	F 1. 0	1	44- 44
SU3	F 1. 0	1	45- 45
SU4	F 1. 0	1	46- 46
F1	F 1. 0	1	47- 47
F2	F 1. 0	1	48- 48
F3	F 1. 0	1	49- 49
B1	F 1. 0	1	50- 50
B2	F 1. 0	1	51- 51
B3	F 1. 0	1	52- 52
B4	F 1. 0	1	53- 53
B5	F 1. 0	1	54- 54

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
B6	F 1. 0	1	55- 55
SC1	F 1. 0	1	56- 56
SC2	F 1. 0	1	57- 57
SC3	F 1. 0	1	58- 58
SC4	F 1. 0	1	59- 59
SC5	F 1. 0	1	60- 60
SC6	F 1. 0	1	61- 61
SB	F 3. 0	1	62- 64
S1	F 1. 0	1	65- 65
S2	F 1. 0	1	66- 66
S3	F 1. 0	1	67- 67
S4	F 1. 0	1	68- 68
S5	F 1. 0	1	69- 69
S6	F 1. 0	1	70- 70
S7	F 1. 0	1	71- 71
S8	F 1. 0	1	72- 72
S9	F 1. 0	1	73- 73
S10	F 1. 0	1	74- 74
S11	F 1. 0	1	75- 75
S12	F 1. 0	1	76- 76
S13	F 1. 0	1	77- 77
I	F 1. 0	1	78- 78
COM	F 1. 0	1	79- 79

THE INPUT FORMAT PROVIDES FOR 63 VARIABLES. 63 WILL BE READ
IT PROVIDES FOR 1 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 79 'COLUMNS' ARE USED ON A RECORD.

```
VAR LABELS      ID, IDENTIFICATION NUMBER/
                ST1,USER STATUS/
                ST2,MAJOR USE/
                ST3,NECESSITY OF COMPUTER/
                E1,YEAR OF FIRST USE/
                E2,PERIOD OF INSTRUCTION/
                E3,PLACE OF INSTRUCTION/
                R1,CLASS RESPONSIBILITY/
                R2,RESEARCH RESP/
                R3,DEPT RESP/
                E4,PREVIOUS USE/
                E5,PRESENT OTHER USE/
                C1,AVG MONTHLY EXPENDITURE/
                C2,AVG USAGE/
                C3,DIST OF USAGE/
                C4,INTENDED USAGE/
                C5,REASONS/
                C6,MAIN LANGUAGE/
                C7,% LANG1/
                C8,SECOND LANGUAGE/
                C9,% LANG2/
                C10,KNOWLEDGE OF MAIN LANGUAGE/
                C11,KNOWLEDGE OF WFL/
                C12,KNOWLEDGE OF SCREAM/
                C13,USE OF PROGRAMS/
                M1,MEDIUM OF SUBMISSION/
                M2,PREPARATIN OF INPUT/
                M3,OUTPUT/
                SU1,CONSULTANCY USE/
                SU2,USER GUIDE POSSESSION/
                SU3,NEWSLETTER SUBSCRIPTION/
                SU4,USE OF DOCUMENTATION/
                F1,USERGROUP MEMBER/
                F2,MEETING ATTENDANCE/
                F3,REPRESENTATIVE CONSULTATION/
                B1,BATCH TURNAROUND/
                B2,BATCH AVAILABILITY/
                B3,SUBMISSION AND COLLECTION/
                B4,QUEUES AND PRIORITIES/
                B5,BATCH LOCATION/
                B6,BATCH FACILITIES/
```

```
SC1,EDIT RESPONSE TIME/
SC2,EXECUTION TIME/
SC3,AVAILABILITY OF TERMINALS/
SC4,RESOURCE LIMITS/
SC5,HELP AVAILABLE/
SC6,SCREAM FACILITIES/
SB,% SCREAM USAGE/
S1,DATA PREP/
S2,FUNDS/
S3,CHARGING FAIRNESS/
S4,CENTRE RESPONSE/
S5,DOCUMENTATION QUALITY/
S6,PROVISION FOR AN UNUSUAL REQUIREMENT/
S7,SYSTEM BREAKDOWN ADVICE/
S8,STAFF AVAILABILITY/
S9,STAFF ABILITY/
S10,REPLACEMENTS/
S11,SESSION AND JOB DIAGNOSTICS/
S12,USERS GROUP/
S13,PLANNING/
I,INTERVIEW/
COM,COMMENTS
VALUE LABELS  ST1 (1)ACADEMIC (2)POSTGRAD (3)UNDERGRAD
(4)REGISTRY (5)EXTERNAL (6)OTHER/
ST2 (1) COSC RESEARCH (2)DATA ANALYSIS (3)PROBLEM SOLVING
(4)INFO PROCESSING (5)CAL/
ST3 (1)IMPOSSIBLE OTHERWISE (2)LIMITED OTHERWISE
(3)SAVE TIME AND EFFORT (4)STUDY OF COMPUTER/
E2 (1)NONE (2)-1WK (3)1WK-1MTH
(4)1-6 MTH (5)6MTH-1YR (6)+1 YR/
E3 (1)NA (2)SELF TAUGHT (3)CENTRE COURSE
(4)UNIVERSITY UNIT (5)OTHER ACADEMIC (6)OTHER INSTITUTE
(7)OTHER/
R1,R2,R3 (1)YES (5)NO/
E4 (0) NO (1) ACADEMIC (2) COMMERCIAL (3) OTHER/
E5 (0) NO (1) ACADEMIC (2) OTHER (3) COMMERCIAL/
C2 (1)NEVER (2)YEARLY (3)QUARTERLY
(4)MONTHLY (5)WEEKLY (6)DAILY/
C3 (1)VERY IRREGULAR (2)IRREGULAR (3)SPORADIC
(4)REGULAR (5)CONTINUAL/
C4 (1)NOT (2)LESS (3)SAME (4)MORE (5)MUCH MORE
C5 (0) NO CHANGE (1) TOO DEAR (2) LESS COMPUTING
(3) ALTERNATIVES (4) DISSATISFIED (11) INCREASING NEED/
C6,C8 (1)ALGOL (2) BASIC (3) COBOL (4) FORTRAN (5) PASCAL
(6) PL-1 (10) VARIOUS PL (11) BMDP (12) FREQUENCY
(13) SPSS (14) TEDDYBEAR (15) GOLLIWOG (16) ECTA
(17) OMNITAB (18) LERTAP (21) VARIOUS PK (30) FILE MANIP
(31) LABELS ETC/
C10,C11,C12 (1)NIL (2)POOR (3)WORKABLE (4)GOOD (5)FLUENT/
C13 (1)PACKAGE (2)REPEATED USE (3)MODIFY
(4)SUPPLY RESULT (5)OTHER/
M1 (1)CENTRE VIA CARDS (2)PREV MED VIA CARDS
(3)QUEUED VIA SCREAM (4)INTERACTIVELY VIA SCREAM/
M2 (1)CENTRE DATA PREP (2)OWN DEPT
(3)PUNCH OWN (4)VIA TERMINAL/
M3 (1)CENTRE (2)DIRECT TO PRINTER (3)COURIER
(4)READ FROM TERMINAL/
SU1 (1)NEVER (2)YEARLY (3)QUARTERLY (4)MONTHLY
(5)WEEKLY+/
SU2 (0)NONE (1)1 (2)2 (3)3 (4)4 (5)5 OR MORE/
SU3 (1)YES (2)NO/
SU4 (1)NEVER (2)INFREQUENTLY (3)OCCASIONALLY (4)OFTEN *
(5)ALL THE TIME/
F1 (1)YES (5)NO/
F2 (1)ONCE (3)TWICE (5)THREE OR MORE TIMES/
F3 (1)NEVER(2)(3)FROM TIME TO TIME(4)(5)FREQUENTLY/
B1 TO SC6,S1 TO S13 (1)HIGHLY DISSATISFIED (2) DISSATISFIED
(3)INDIFFERENT (4)SATISFIED (5)HIGHLY SATISFIED/
I,COM (0)NO (1)YES
RECODE  ST1 TO ST3(BLANK=9)/
E1(BLANK=99)/
E2 TO E5(BLANK=9)/
C1(BLANK=9999)/
C2 TO C4(BLANK=9)/
```

```
                 126                 C5 (BLANK=0)/
                 127                 C6 (BLANK=99)/
                 128                 C7 (BLANK=0)/
                 129                 C8 (BLANK=99)/
                 130                 C9 (BLANK=0)/
                 131                 C10 TO SC6 (BLANK=9)/
                 132                 SB (BLANK=999)/
                 133                 S1 TO S13 (BLANK=9)/
                 134                 I,COM (BLANK=0)/
                 135 MISSING VALUES  ST1 TO ST3(9)/
                 136                 E1(99)/
                 137                 E2 TO E5(9)/
                 138                 C1(9999)/
                 139                 C2 TO C4(9)/
                 140                 C5 (0)/ C6(99)/ C7 (0)/ C8 (99)/
                 141                 C10 TO SC6(9)/
                 142                 SB(999)/
                 143                 S1 TO S13(9)
                 144 FREQUENCIES     INTEGER=ST1 TO ST3,E2 TO E5,C2 TO C5(0,9)
                 145                       C6,C8(1,99) C10 TO SC6,S1 TO S13(0,9)
                 146 STATISTICS      1,5

 FREQUENCIES PROBLEM REQUIRES  1224 WORDS OF SPACE

                 147 READ INPUT DATA
```

APPENDIX 5

INTERVIEW CASE STUDIES

CASE STUDY 1

The person studied was a Post-graduate using the computer for analysis of data for a thesis. He was using SPSS mainly, although he made limited use of FORTRAN. He had little previous computing experience. He used both interactive and batch modes of communication.

SCORES

(Score: 1 = Dissatisfied, 4 = Satisfied)

SCREAM		BATCH		GENERAL	
HELP	1	BATCH	4	PEOPLE	2
SCREAM	3	PEOPLE	2	POLICY	1
POLICY	1	SERVICES	4	MONEY	1
SERVICES	3	MONEY	1	SERVICES	3
				CENTRE HELP	4

This person had high scores on the personal, batch and service aspects of his interaction but was concerned about the SCREAM HELP factor and money. The reasons for these scores became apparent during the interview.

This person was very satisfied with the batch service which he found fast and reasonably easy to use. When he had problems he saw a member of the Computing Centre for help. This was given willingly and cheerfully, although sometimes there was a problem in communication.

His experiences with SCREAM were not as happy. He had had one class training session on SCREAM and found it quite difficult. He would like to have more education on SCREAM and general computing but was unable to take a course in it. As a result he feels somewhat lacking in control with computing in general.

When interviewed he was using the VAX as there were convenient terminals. He found the interactive system much easier to use and was particularly impressed with the HELP facility. The fact that the VAX was free at this stage also appealed to him as he is rather constrained with regard to money. The charging rate concerns him.

He did not know of the existence of the Users Group.

CASE STUDY 2

This person was a Senior Lecturer. He was using FORTRAN to develop algorithms for research purposes. He was an experienced user and used both SCREAM and BATCH modes of communication.

SCORES:

SCREAM:		BATCH:		GENERAL:	
HELP	4	BATCH	2	PEOPLE	4
SCREAM	4	PEOPLE	4	POLICY	4
POLICY	2	SERVICES	3	MONEY	1
SERVICES	2	MONEY	1	SERVICES	2
				CENTRE HELP	4

These results show concern about money, batch and services, but on the other factors he has high scores.

This person was first questioned about batch. He uses this quite often and finds the operators friendly. As he prefers to use it at night he has to use slave printers for printouts - these he finds to be noisy and tend to interfere with other workers. He would also like there to be a decrease in the night rates, which are at present 10% lower than normal rates.

His use of SCREAM was also important to him. He found the manual difficult to read and tended to ask other people for advice rather than use the manual. There were

aspects of the EDIT mode he found confusing and sometimes contrary to expectation. He also said that the speed was quite variable with compilation sometimes being very slow.

This person is not a member of the Users Representative Group. He felt that if he had a problem or suggestion of a policy nature that he would tend to see someone from the Centre, but considers the Users Group a possible avenue of approach. He is critical of the charging rate which he considers too high.

He is satisfied with the replacements and finds the VAX system good. He would like a high quality printer linked to either system.

When a problem with the system arouse he has seen one of two people at the Centre who deal with the system. These people were generally available and helpful.

APPENDIX 6

USER POPULATIONS OF

CANTERBURY AND OTAGO

USER POPULATIONS 1980

Proportion use of Computer by Faculty.

Faculty/Group	Canterbury	Otago
ARTS	1.4	5.0
COMMERCE	3.4	2.7
COMPUTING CENTRE	4.1	15.2
DENTISTRY	-	1.1
ENGINEERING	15.9	-
FORESTRY	0.7	-
LINCOLN COLLEGE	13.5	-
MEDICINE	-	13.6
PHYSICAL EDUCATION	0.0	0.3
REGISTRY	8.0	25.9
SCIENCE	32.8	24.6
OTHER	20.0	11.6

Questionnaire Response by Status

Status	Canterbury 1980	Otago 1981
Academic staff member	31%	47%
Postgraduate student	22%	13%
Undergraduate student	30%	26%
Registry employee	(Not surveyed)	3%
External user	13%	4%
Other	4%	8%